Growndwater Quality at Down Stream Area of River Basin by using Geospatial Engineering

M.Satish Kumar, G.Venu Ratna Kumari, Ambati Dattatreya Kumar, M.V.Raju

Abstract: Water is the most precious natural resource for the survival of any living organism gifted by GOD which is available as surface water and Groundwater. Rivers are the most important surface water sources to meet the daily requirement of water demand for various activities of the people at any area around the whole world, but in the current scenario rivers are getting pollute due to various natural and manmade activities especially at the down steam areas of rivers. The major source for downstream pollution are due to the runoff of the nearby areas and also some times through the upstream polluted water flow of the rivers which is quite common in the developing cities of our country either by the negligence of the people and or due to the unaware of un desirable consequences of coastal pollution on the environment as well as on the living standards of the people living near to the coastal belts. Geo spatial technology is the advanced tool in water resource engineering to understand the exact existed scenario of groundwater prospects with high accuracy and reliability. The present study is carried out at downstream area of Krishna River in Guntur district of Andhra Pradesh, all the groundwater samples were collected from hand pumps and the bore wells at study area for three times and the average values are considered as final values, Analysis was carried out by using standard analytical procedure and the final average results were projected in GIS maps and then correlated with IS–10500-2012 drinking water quality standards to assess the present condition of groundwater at study area.

Key words: Coastal, Groundwater, Geospatial technology, Polluted water, River, Upstream.

I INTRODUCTION

In the world scenario as the developmental activities are moving forward rapidly with significant impact on living standards of the people by offering various technological solutions for many complex environmental issues such as replacing carbonaceous fuels with eco friendly compressed natural gases (CNG), producing power from wind, utilization of solar energy etc,

but at most of the times we are unable to reduce water pollution more particularly in rivers which may contaminate either through natural calamities such as floods and cyclones or other manmade activities.

The level of water contamination can be reduced by proper utilization of scientific technology such as early prediction of cyclones and creating awareness among the people on dangerous and un desirable consequences of water contamination especially at coastal belts.

Groundwater never in pure conditions by nature it consists certain essential elements, gases which can be portable for drinking or any other purpose with or without treatment but now a days it has been observing that groundwater contamination is increasing everywhere due to over lifting of water for various needs leads to intrusion of various pollutants in to the freshwater aquifers similarly pollutants from various sources also entering into the freshwater zones of underground which makes water unfit for consumption, this is most commonly identified phenomena along the river flow areas from where water percolates in to the underground aquifers along with pollutants then they accumulates with high concentration. The chemicals contaminants along with other pollutants at river basins cause huge damage to the groundwater. In India most of the urban areas are developed across the river basins due to surplus availability of water but at present the river basins are turned as pollution hubs due to unscientific handling of river water and improper maintenance of coastal belts which in turn leads groundwater pollution. The present study was carried out in two mandalas namely tadepalli and mangalagiri in the downstream area of Krishna River basin of Guntur district, analysis was carried out for basic water quality parameters such as P^H, alkalinity, hardness, total solids, and total dissolved. All the tests were conducted by standard analytical methods to assess the basic quality of water.

II OBJECTIVE

To examine quality of groundwater and preparation of GIS maps on water quality at study area along with preparation of environmental management plan for river banks.

III METHODOLOGY

III.I Collection of water Samples:

1. Five sampling locations were located at every identified village of two mandalas in the study area based on the possible contaminant zones of groundwater near to the river belt.
2. Collected water samples from hand pumps and bore wells in the study area.

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1236

III.II Water quality Analysis:

1. Analysis was done for selected predominant characteristic features of water quality parameters as a pilot study to find out the basic status of the water quality

2. Basic standard procedures were adopted for analytical examination of P^H, alkalinity, hardness, total solids, and total dissolved.

3. Water samples were collected from five locations at every village for three times and the average values were considered as final results.

III.III Acquisition of Geospatial data:

1. PAN (Panchromatic) and LISS-III (Linear Image Self Scanner) satellite data were enhanced and corrected geometrically.

2. By applying techniques of principle component method and cubic convolution re sampling method both PAN and LISS satellite data were merged then projected with 1:50,000 scale in FCC (False Colour Composite).

III.IV Creation of data base:

1. Visual Image interpretation techniques were employed to prepare base maps and settlement maps of the study area.

2. Arc view and Arc info software were adopted for scanning and digitization of maps.

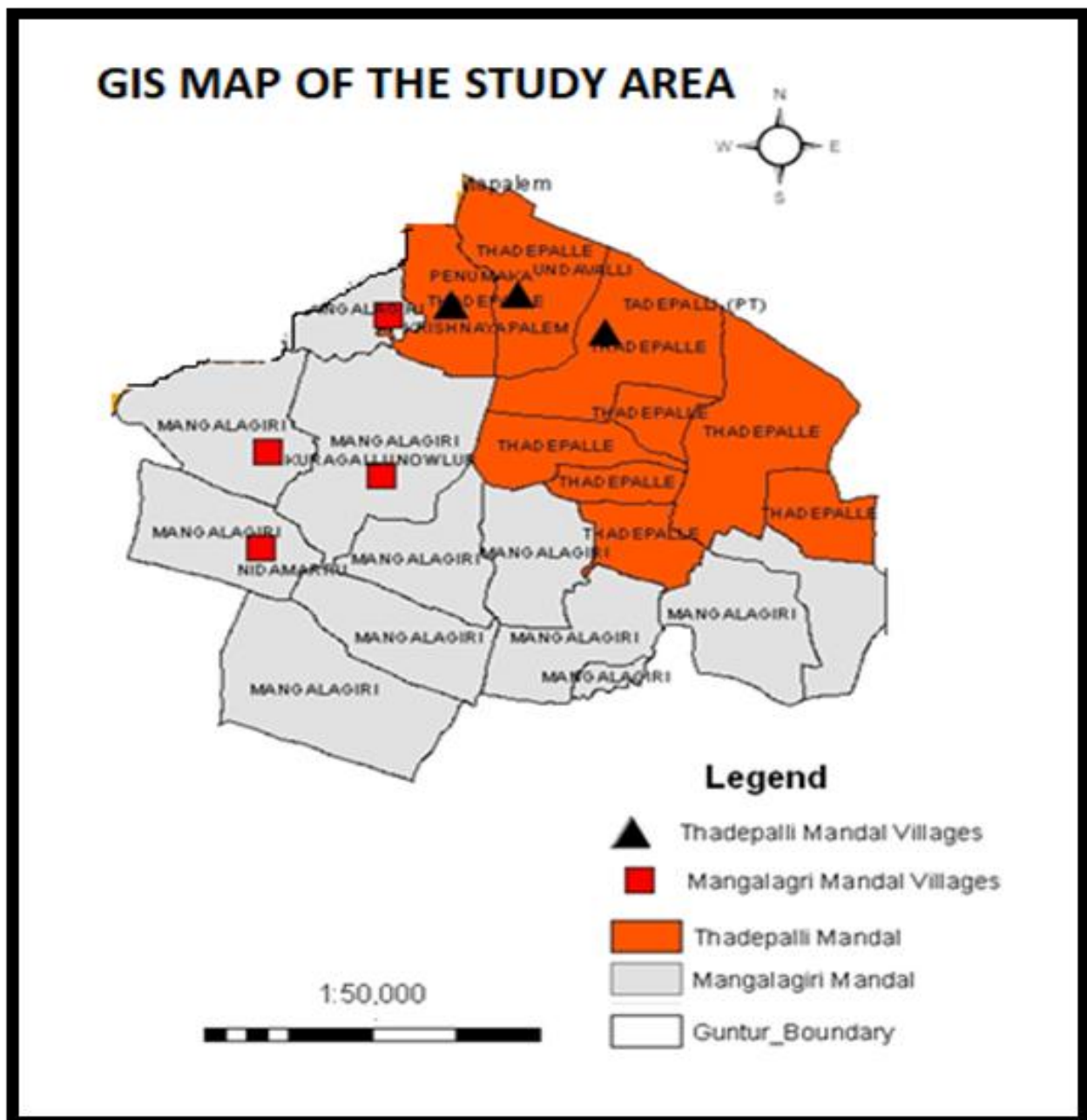3. With reference to field observations corrections were completed in producing final maps.

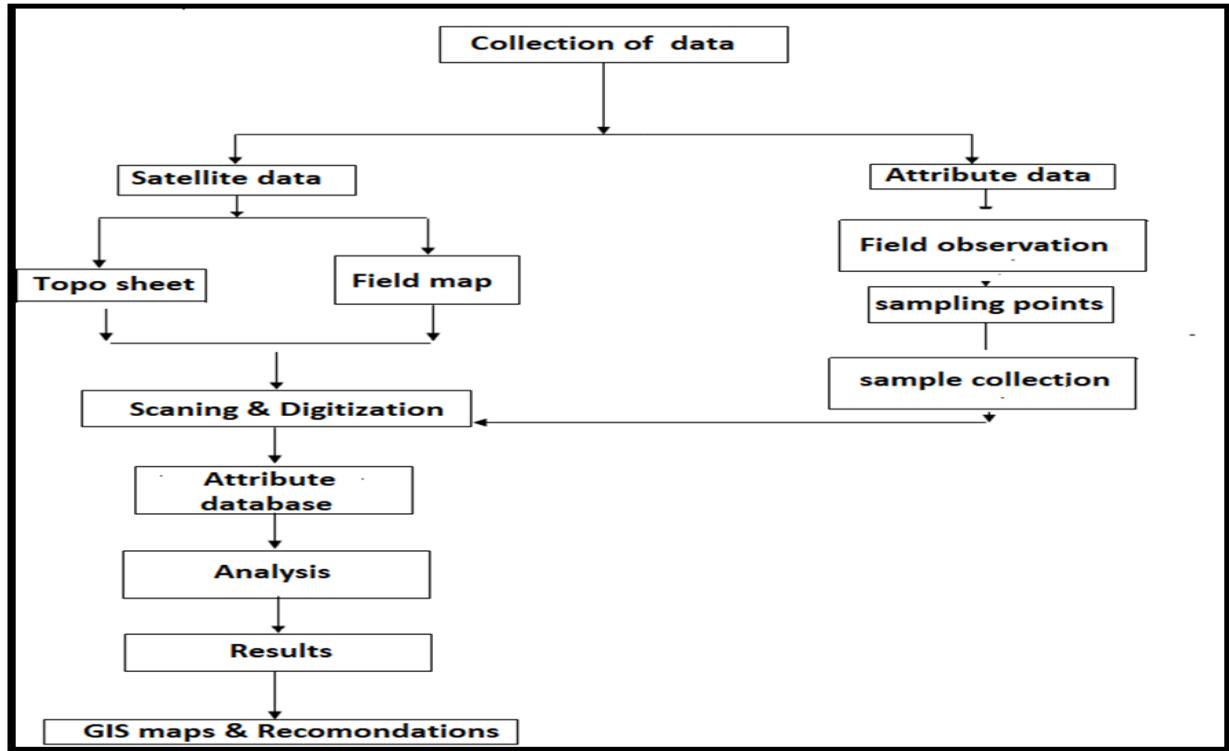**Figure: 1 GIS map for the study area**

Figure 2: Flow chart of methodology

Table 1: Water quality analysis at study area

VILLAGE NAME	P^H			ALKALINITY			HARDNESS			TOTAL SOLIDS			TOTAL DISSOLVED SOLIDS		
	DEC	JAN	FEB	DEC	JAN	FEB	DEC	JAN	FEB	DEC	JAN	FEB	DEC	JAN	FEB
UNDAVALLI	7.1	7.3	7.5	226	240	232	251	265	271	376	359	383	371	348	370
PENUMAKA	7.6	7.9	7.7	214	220	228	276	259	282	383	379	368	370	361	350
KR.PALEM	7.9	7.5	7.7	222	231	239	256	267	276	391	382	379	381	373	366
NIDAMARRU	7.6	7.5	7.7	244	232	230	289	272	281	389	359	376	372	346	369
KURAGALLU	7.3	7.4	7.6	239	246	241	272	286	290	362	372	377	351	363	368
NAWULURU	7.8	7.6	7.7	241	236	226	278	281	289	366	381	389	352	376	378

Growndwater Quality at Down Stream Area of River Basin by using Geospatial Engineering

Table 2: Average values of three months results

VILLAGE NAME	P^H	ALKALINITY	HARDNESS	TOTAL SOLIDS	TOTAL DISSOLVED SOLIDS
	Average	Average	Average	Average	Average
UNDAVALLI	7.2	232	262	372	363
PENUMAKA	7.7	220	272	376	360
KR.PALEM	7.7	230	266	384	373
NIDAMARRU	7.7	235	280	374	362
KURAGALLU	7.7	242	282	370	360
NAWULURU	7.5	234	282	378	368
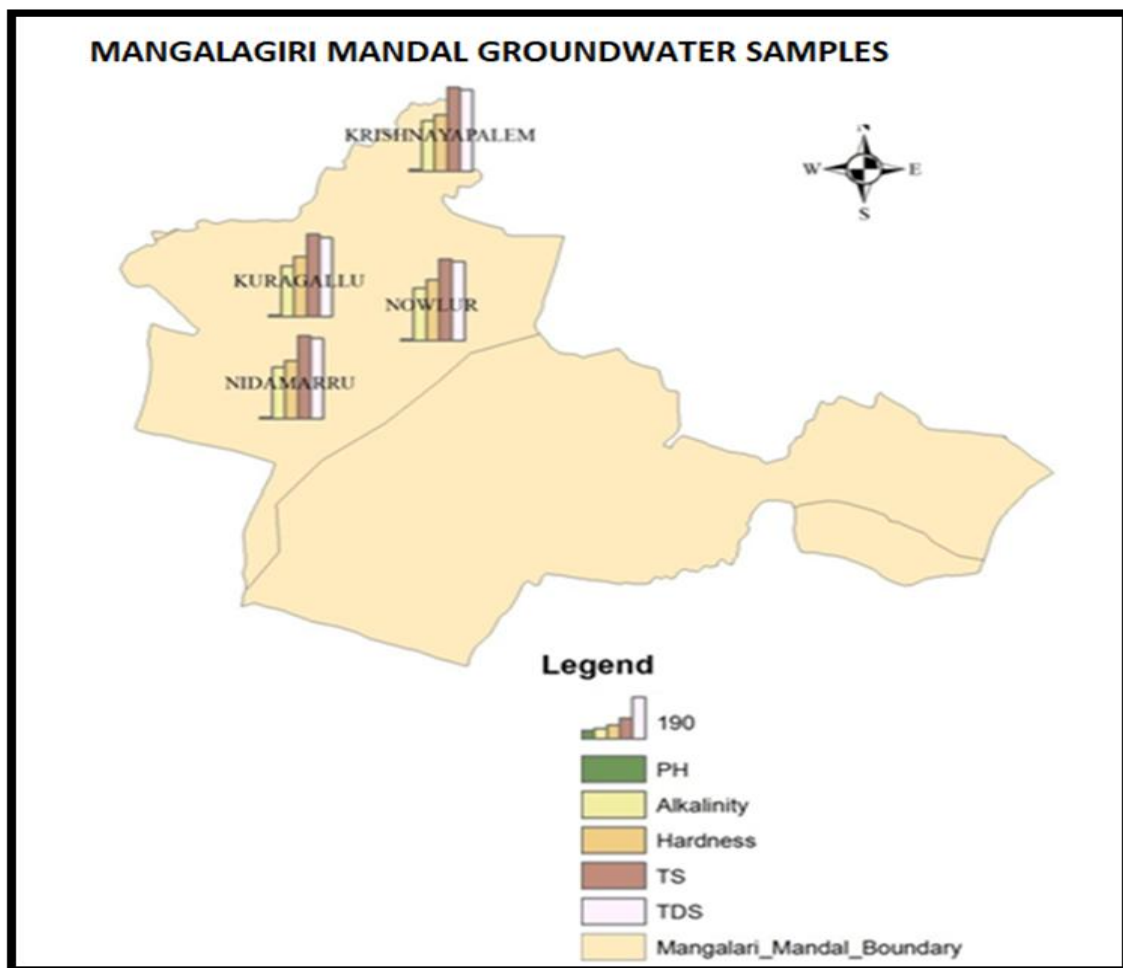
Figure 3: GIS map for groundwater quality at mangalagiri mandal
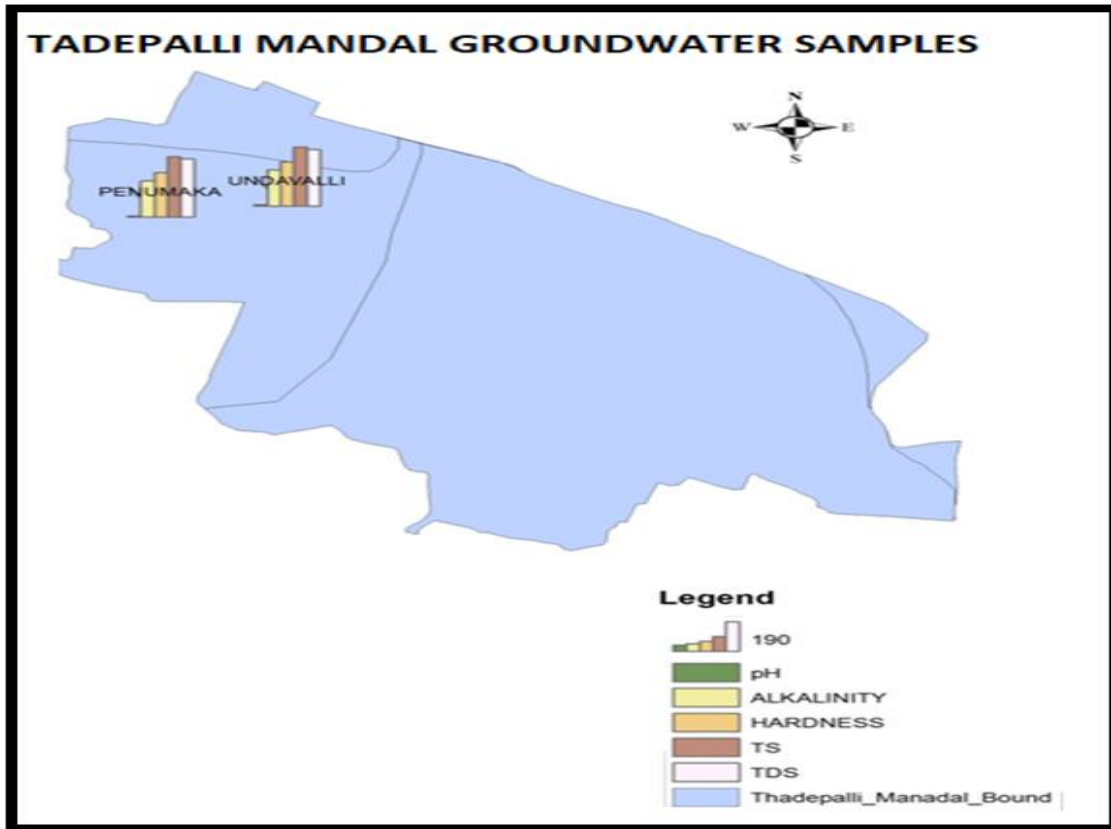
IV.   RESULTS AND DISCUSSIONS

S.NO	PARAMETER	EXPLANATON
1	P^H	The P^H of the water samples correlated IS 10500-2012 drinking water quality standards and it shows that P^H of the water samples were within permissible levels
2	Alkalinity	The alkalinity of water samples was within the permissible level as per IS 10500-2012 drinking water quality standards
3	Hardness	Hardness of the water samples also with in the permissible levels when correlated to IS 10500 -2012 drinking water quality standards
3	Total Solids and Total dissolved solids	Both total solids and total dissolved solids also with in the acceptable limits can be used for consumption as per the drinking water quality standards of IS 10500 -2012 drinking water quality standards
4		1. The basic nature of water quality n the areas near to the Krishna river were analyzed 2. Geo spatial engineering is most adoptable advanced technology in preparation of water quality maps which can be used as efficient tool in identification and prediction of possible changes in future with respect water resource engineering 3. GIS maps were prepared for all the parameters separately for two mandalas to be used as future reference. 4. Integration of Geospatial engineering is helps to understand location wise information on water quality so that an immediate action can be taken on contaminated locations to bring down the level of contamination 5. The present condition of the groundwater is safe and can be consumed by adopting basic water treatment methods

V.CONCLUSIONS

1. Water quality in the river basin never in static conditions as it is always influenced by the activities of nearby people and the climatic conditions during the flow of river course.
2. Coastal belts must be monitored regularly to maintain aquatic equilibrium as well as to protect the water sources to meet the future demand of water
3. Geospatial engineering provides frame work to ingrate statistical data, spatial analysis along with various mapping technique for decision making in sustainable utilization of natural resources.

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1240

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